



US005695733A

**United States Patent** [19]**Kroc et al.**[11] **Patent Number:** **5,695,733**[45] **Date of Patent:** **Dec. 9, 1997**[54] **CLUSTERED PRECIPITATED CALCIUM  
CARBONATE PARTICLES**[75] **Inventors:** **Vicki J. Kroc, Nazareth; George H.  
Fairchild, Bethlehem, both of Pa.**[73] **Assignee:** **Minerals Technologies Inc., New York,  
N.Y.**[21] **Appl. No.:** **674,710**[22] **Filed:** **Jul. 1, 1996****Related U.S. Application Data**

[63] Continuation of Ser. No. 449,612, May 24, 1995, abandoned, which is a continuation of Ser. No. 218,045, Jun. 22, 1994, abandoned, which is a continuation of Ser. No. 863,276, Apr. 3, 1992, abandoned.

[51] **Int. Cl.<sup>6</sup>** ..... **C01F 11/18**[52] **U.S. Cl.** ..... **423/432**[58] **Field of Search** ..... 162/181.2; 423/430,  
423/432, 165, 266; 106/464[56] **References Cited****U.S. PATENT DOCUMENTS**

2,538,802	1/1951	Schur et al.	423/432
3,120,426	2/1964	Crawford	23/66
3,126,253	3/1964	Podschus	23/66
3,320,026	5/1967	Waldeck	423/432
3,627,480	12/1971	Birschall	23/66
4,244,933	1/1981	Shibazaki et al.	423/430
4,714,603	12/1987	Vanderheiden	423/432
4,762,588	8/1988	Hirano et al.	156/623 R
4,857,291	8/1989	Ota et al.	423/430
4,888,160	12/1989	Kosin et al.	423/432
5,007,964	4/1991	Tsukisaka et al.	106/464
5,043,017	8/1991	Passaretti	106/465
5,262,006	11/1993	Andersson et al.	162/181.2

**FOREIGN PATENT DOCUMENTS**

64-18911 1/1989 Japan .

2-50890	2/1990	Japan .
2-55370	11/1990	Japan .
2145074	3/1985	United Kingdom .

**OTHER PUBLICATIONS**

Yamada—Journal of the Pulp and Paper Technology Society, vol. 44, No. 1 (Jan. 1990), pp. 62–69.

Yamada et al.—Government Industrial Research Institute, Kyushu, AIT, MITI (Nov. 1983).

Yamada et al.—Gypsum and Lime No. 203 (1986), pp. 221–228.

Yamada et al.—Government Industrial Research Institute, Kyushu (1988).

Yamada, "Synthesis of Flat Basic Calcium Carbonate and Its Use as a Paper Coating Pigment", *Kami Parapu Taimsu*, No. 7, pp. 29–32 (Kyushu Industrial Engineering Testing Institute 1988).*Primary Examiner*—Michael Lewis*Assistant Examiner*—Stuart L. Hendrickson*Attorney, Agent, or Firm*—Marvin J. Powell; Terry B. Morris[57] **ABSTRACT**

Novel precipitated calcium carbonate particles in clustered form, which when used as fillers impart improved strength, opacity and other advantages to paper, are prepared by a process involving adding lime and carbon dioxide to a reaction mixture containing seed material having a scalenohedral morphology, the lime and carbon dioxide being added simultaneously. The flow rates of the lime and carbon dioxide are adjusted to control the solution conductivity of the reaction mixture to between about 2.0 and about 4.0 mS to form the clusters of calcite particles, the clusters having an average equivalent spherical diameter of between about 1.5 and 3.5 microns and a specific surface area of between about 2.0 and 9.0 m<sup>2</sup>/g. At least about 25% of the particles of said clusters have a prismatic form.

**9 Claims, 5 Drawing Sheets**